MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2016/2017

HHG 1011 – BASIC HUMAN GENETICS

10 MARCH 2017
3.00pm – 5.00pm
(2 hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **5** printed pages, including this cover page.
2. All questions are worth 10 marks each.
3. Please attempt ALL QUESTIONS printed on this paper.
4. Please print all your answers in the answer booklet provided.

Question 1

a) All of us may have at least one genetic mutation either it inherited or occurred randomly. With an examples, distinguish positive mutation and negative mutation. 4 marks

b) The telomere theory of aging is based on the observation that telomeres of body cells generally shorten after each cell division. Briefly describe, whether the theory can be the cause the Hutchinson-Gilford Progeria Syndrome. 3 marks

c) Briefly explain differences between major types of RNA molecules that play an important role in the cell? 3 marks

Question 2

a) Misfolded proteins are believed to be the primary cause of Alzheimer disease. However, this disease also cause by mutations in three genes lead to the early-onset autosomal dominant Alzheimer disease. With the aid of diagram, explain how these mutations happened. 4 marks

b) Figure 1 is a pedigree of a family with hypercholesterolemia, a disease characterized by reduced number of functional low density lipoprotein receptors. 4 marks

Briefly explain, what is the most likely mode of inheritance? Cite reasons for your answer.

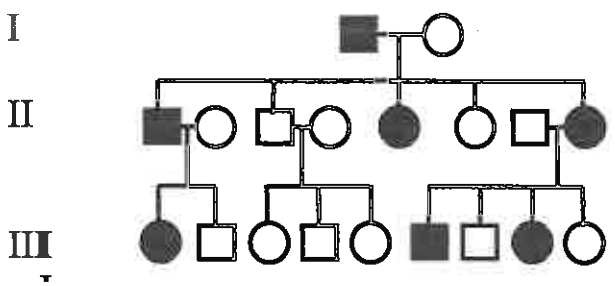

Figure 1

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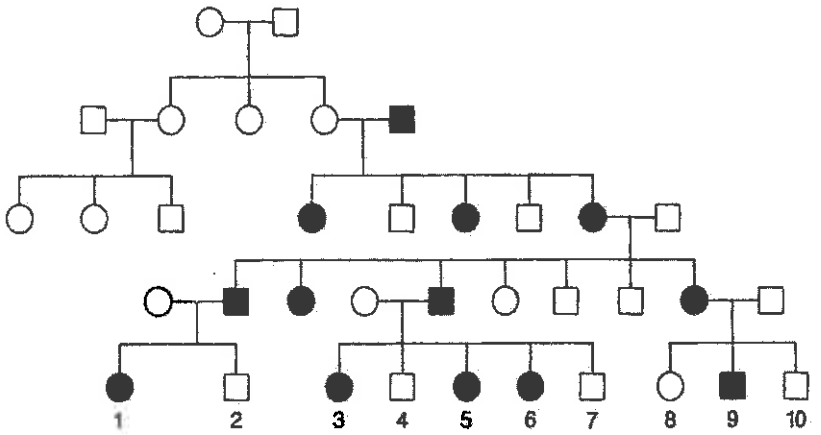

Figure 2

c) Figure 2 shows a pedigree with specific pattern of inheritance. Interpret the pattern of inheritance and explain your reasoning. 2 marks

Question 3

a) Briefly explain the role of genetic drift which contributes in changing allele frequency. What are the factors that enhance the effect of genetic drift? 3 marks

b) Cystic fibrosis is a recessive autosomal trait. In certain Caucasian population, the number of people born with this disorder is about 1 in 2,500. Assuming random mating, what is the probability that two phenotypically unaffected heterozygous carrier will choose each other as mates. 4 marks

c) Distinguish the phenotypes of the following genotypes [47,XXY], [47, XYY] and [46, XY del (7q)] which occurred in Tengkera population. 3 marks

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Question 4

a) Give the definition of Single Gene Inheritance and list 3 categories of Single Gene Inheritance — 4 marks

b) The following are the genetic facts about; — 4 marks

- Twin studies estimate heritability at 36-79%
- Three times more likely to have asthma if mother has asthma

Do you agree that Asthma is an example of Single Gene Disorder (mendelian disorder)?
Discuss 2 genes that associate with Asthma in term of their functions

c) Cardiovascular diseases are affected by genes and environment. The following table, show the relational matrix between genes and environment, and the risk of having cardiovascular diseases (CAD) — 2 marks

	"good" genes	"bad" genes
[redacted]	low risk of CAD	medium risk of CAD
	medium risk of CAD	high risk of CAD

Based on the facts above, give your recommendation to your parents on what they can do to reduce their risk of CAD in their life time.

Question 5

a) Viral infections are contributing to 20% of various human carcinoma. What this discovery is consider a good news in the medical field? Briefly discuss your answer. — 2 marks

b) Describe 2 common process that carcinogenic virus employed to cause carcinoma in human. Give 1 example of virus for each process. — 4 marks

c) Primarily two types of genetic mutation events create all forms of pharmaco-genetic variation. Name the events and suggest how this knowledge can be used for personalize medicine initiative. — 4 marks

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Question 6

a) Define Gene Therapy. List four approaches used in gene therapy. 3 marks

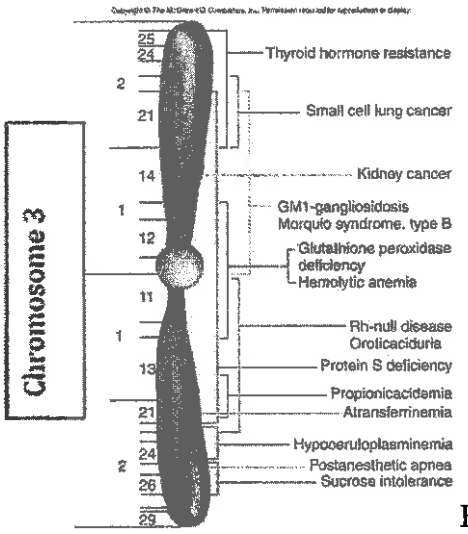

Figure 3

b) In cytogenetic field, what is the name of Figure 3 in genetic filed? Name the location of Sucrose intolerance gene according to cytogenetic naming standard 2 marks

c) Knockout mice are valuable to study gene function. Describe the approach used in producing knockout mice using Gene Targeting technology 3 marks

d) Name 2 potential application of Gene Targeting technology in agriculture industry in the next 20 years. 2 marks

End of paper.